1   **HELMET WITH A TIRE STATUS APPARATUS**

2   <u>BACKGROUND OF THE INVENTION</u>

3   1. Field of the Invention

4   The present invention relates to a helmet for a motorcycle rider, and

5   more particularly to a helmet that has an apparatus to present tire status and warn

6   a motorcycle rider of abnormal tire parameters.

7   2. Description of Related Art

8   Motorcycle riders wear helmets to protect their heads in the event of an

9   accident. Unlike automobiles, motorcycles do not have many safety devices such

10   as tire pressure monitoring systems. Properly inflated tires are essential to the

11   safety operation of vehicles including motorcycles so drivers or riders must learn

12   to notice the tire status and understand its significance.

13   Vehicles with a tire pressure monitoring system have tire pressure

14   gauges mounted respectively in the wheels to sense the current tire pressure and

15   send a signal with the current tire pressure to a main controller in the vehicle,

16   which presents the current tire pressure to the driver. Thus, the driver is made

17   aware the situation of the wheel and further notices whether the wheels need to

18   be replaced or maintained. However, motorcycle riders do not have the ability to

19   constantly monitor pressure tire to or determine when the wheels on the

20   motorcycle are unsafe.

21   To overcome the shortcomings, the present invention provides a helmet

22   having a tire status capability to mitigate or obviate the aforementioned

23   problems.

24   <u>SUMMARY OF THE INVENTION</u>

1   The main objective of the present invention is to provide a helmet that

2   receives various tire parameters from two wheels of a motorcycle and projects

3   the tire parameters so a rider wearing the helmet can see the current parameters.

4   Another objective of the present invention is to provide a helmet that

5   determines when tire parameters are abnormal and presents an abnormal symbol

6   to warn a rider wearing the helmet that the tire is unsafe.

7   Another objective of the present invention is to provide a helmet that has

8   a power-saving function. The objective is achieved by mounting at least one

9   sensor switch in the helmet to detect when a rider is wearing the helmet. If the

10   rider is wearing the helmet, the helmet enables the tire status capability.

11   Therefore, the helmet saves power when the rider is not wearing the helmet.

12   Other objectives, advantages and novel features of the invention will

13   become more apparent from the following detailed description when taken in

14   conjunction with the accompanying drawings.

15   BRIEF DESCRIPTION OF THE DRAWINGS

16   Fig. 1 is a cross sectional side plan view of a helmet in accordance with

17   the present invention;

18   Fig. 2 is a front plan view of the helmet in Fig. 1;

19   Fig. 3 is a functional block diagram of a controller mounted in the

20   helmet in Fig 1 communicating with two tire status sensors;

21   Fig. 4 is an operational side plan view of a person wearing the helmet in

22   Fig. 1 and riding in a motorcycle with tire status sensors;

23   Fig. 5 is a flow chart of a procedure to determine abnormal tire status in

24   accordance with the present invention;

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1   Figs. 6 is a flow chart of a procedure to set a new pressure in the

2   controller in accordance with the present invention; and

3   Fig. 7 is an operational block diagram of a method in accordance with

4   the present invention of operating the helmet in Fig. 1.

5   DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

6   With reference to Figs. 1 and 4, a helmet in accordance with the present

7   invention communicates with a front tire status sensor (40) and a rear tire status

8   sensor (50) mounted respectively in a front wheel and a rear wheel of a

9   motorcycle. Each tire status sensor (40, 50) detects multiple tire parameters,

10   formats the tire parameters into tire status information signals and sends tire

11   status information signals to the helmet. The helmet receives the tire status

12   information signals and displays the tire status information to the rider. The tire

13   status parameters include tire pressure, tire temperature, tire air leakage, etc.

14   With further reference to Fig. 1, the helmet has a body (10) with an

15   opening (11), a face guard (12), a projector (24) and a controller (20).

16   With further reference to Fig. 2, the face guard (12) has an inside surface

17   (not numbered), pivots relative to the body (10) and covers the opening (11). The

18   inside surface has a display area (121). The display area (121) is not directly in

19   front of the rider's eyes so the display area (121) does not obstruct the rider's

20   vision. The display area (121) is coated with a reflective layer (not shown) so an

21   image projected on the display area (121) is clearer.

22   The projector (12) is mounted in the body (10), faces toward the opening

23   (11) and projects an image toward the opening (11). When the face guard (12) is

24   closed and covers the opening (11), the image will be displayed on the display

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1   area (121).

2   With further reference to Fig. 3, the controller (20) controls and drives

3   the projector (24), receives the tire status signals from the two tire status sensors

4   (40, 50), sends the tire status information to the projector (24) that displays the

5   tire status on the face guard (12) and may optionally detect abnormal tire

6   conditions and present a warning to the person wearing the helmet. The

7   controller (20) comprises a microprocessor (21), an RF receiver (22), an optional

8   alarm circuit (23), a power circuit (25), a power detecting unit (251), a video

9   driver (241), memory (26), an enabling switch (30) and a face guard sensor (31).

10   The microprocessor (21) receives the tire status signals through the RF

11   receiver (22). The microprocessor (21) is connected to the projector (24) through

12   the video driver (241) and is further connected to the alarm circuit (23), the

13   memory (26). The power circuit (25) provides the power to the forgoing circuits.

14   The power detecting unit (251), which is connected between the microprocessor

15   (21) and the power circuit (25), responses the voltage changes of the power

16   circuit (25) to the microprocessor (21). The microprocessor (21) obtains the

17   current voltage through the power detecting unit (251) and determines whether

18   the power circuit (25) outputs enough voltage or not. If the microprocessor (21)

19   determines the power circuit in low voltage situation and then drives the alarm

20   circuit (23) to warn the rider. The power detecting unit (251) could be an analog

21   to digital converter (ADC) or a comparator. The analog to digital converter is

22   integrated with the microprocessor (21).

23   Each tire status sensor (40, 50) generates a unique code so the

24   microprocessor (21) recognizes the source of a specific tire status signal. For

1   example, when the front tire status detector (40) transmits the current tire

2   pressure signals to the controller (21), the microprocessor (21) obtains the

3   current tire pressure of the front wheel and drives the projector (24) to display the

4   current pressure on the face guard (12). The rider wearing the helmet can read

5   the pressure on the face guard (12).

6   The enabling switch (30) is connected to the microprocessor (21) and

7   allows the microprocessor (21) to start, prevents the microprocessor (21) from

8   starting or shuts down the microprocessor (21). The enabling switch (30) is

9   mounted on an appropriate position in the body (10) to sense when a person is

10   wearing the helmet. The enabling switch (30) may be a photocoupler. The

11   photocoupler changes output signal when the helmet is placed on a person's head.

12   Thus, the microprocessor (21) may commence operation when the enabling

13   switch (30) indicates that the rider is wearing the helmet.

14   The face guard sensor (31) is mounted on an edge of the opening (11) to

15   detect when the face guard (12) covers completely the opening (11). Therefore,

16   the enabling switch (30) and face guard sensor (31) may be photocouplers,

17   mechanical switches, pressure switches, etc. or a combination of the foregoing.

18   With reference to Fig. 7, the microprocessor (10) executes a procedure to

19   receive and display tire status signals and a procedure to determine and display

20   abnormal tire status. The microprocessor stores preset tire parameters in memory.

21   With reference to Fig. 6, for example, presetting a tire pressure value is

22   accomplished using the following steps: (a) inflating the front and rear wheels

23   until the tire pressure value is equal to a standard value; (b) receiving the new tire

24   pressure value through tire status sensors; and (c) assigning the new tire pressure

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1 value as a preset tire pressure value.

2 With reference to Fig. 7, the procedure to receive and display tire status

3 signals is composed of the following acts

4 (a) Detecting whether the enabling switch is turned on. If the enabling

5 switch is turned on, the next step executes. If the enabling switch turns off, the

6 enabling switch is queried until the enabling switch turns on.

7 (b) detecting whether the face guard sensor switch turns on? If the face

8 guard sensor switch turns on executing the next step; if the face guard sensor

9 turns off, alarming or display a face guard unclosed warning symbol on the face

10 guard to warn the rider the face guard does not covered the opening completely

11 and keep detecting the face guard sensor switch until the face guard sensor

12 switch turns on;

13 (c) detecting whether the power circuit is in low power state? If yes,

14 alarming or display low power warning symbol on the face guard to warn the

15 rider the power is not enough; if no, executing the next step;

16 (d) receiving the tire status signals from the front and rear tire status

17 sensors;

18 (e) reading presetting tire status values corresponding to the tire status

19 signals produced by Fig. 6;

20 (f) executing the determining abnormal tire status signal means; and

21 (g) determining whether the tire status signals are abnormal? If yes,

22 alarming or display alarming symbols to the face guard and storing the abnormal

23 tire status signals in the memory; if not, display the current tire status values on

24 the face guard.

1   With reference to Fig. 5, the determining abnormal tire status signal

2   means is composed the step of:

3   (a) calculating a largest pressure value which is equal to the presetting

4   pressure value multiplied x%; wherein the x could be a 150

5   (b) calculating a least pressure value which is equal to the presetting

6   pressure value multiplied y% which is smaller than x %, wherein the y could be a

7   75;

8   (c) comparing the current tire pressure signal with the largest pressure

9   value to determine whether the current tire pressure signal is larger than the

10   largest pressure value; if yes, the current tire pressure signal is abnormal; if not,

11   executing the next step;

12   (d) comparing the current tire pressure signal with the least pressure

13   value to determine whether the current tire pressure signal is less than the least

14   pressure value; if yes, the current tire pressure signal is abnormal; if not,

15   executing the next step; and

16   (e) assuming the current tire pressure signal being normal.

17   Based on the forgoing description, the present invention provides rider

18   useful information about the wheels during riding the motorcycle. The present

19   invention has lots of advantages as follow:

20   1. Better safety. The controller displays the current tire status values on

21   the face guard so the ride can understand the information about the front and rear

22   wheels. In addition, the display area is not on the line of the vision so the display

23   area does not effect the rider to ride the motorcycle.

24   2. Saves power. The controller will be in sleeping mode when the

1   enabling switch does not turn on so the controller can save power when the

2   helmet is not worn on the rider.

3   3. Alarm function. The controller is connected to the alarm circuit and

4   drives the alarm circuit in hard conditions such as low power, the abnormal tire

5   status signal, the face guard covered the opening incompletely.

6   4. Display function. The controller drivers the projector to display the

7   information related to the current tire status signal, specific alarming symbol etc.

8   to the face guard.

9   Even though numerous characteristics and advantages of the present

10 invention have been set forth in the foregoing description, together with details

11 of the structure and function of the invention, the disclosure is illustrative only,

12 and changes may be made in detail, especially in matters of shape, size, and

13 arrangement of parts within the principles of the invention to the full extent

14 indicated by the broad general meaning of the terms in which the appended

15 claims are expressed.